write the derivatives of:

1. $\tan^{-1}x$
2. uv
3. $\sec x$
4. $\ln x$
5. 3^x

Feb 26-8:27 AM

Review 5 tangent lines, linear approximations

local linearity: zoom in on a curve, it looks like a line (tan line)

$y=x^2$

$y'=2x$

$x=2 \quad y'(2)=2\cdot 2=4$

find this line

$y=4(x-2)+4$

pt-slope

$y=m(x-x_1)+y_1$

tan line

$y=f'(a)(x-a)+f(a)$

$y=f(a)+f'(a)(x-a)$

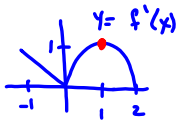
1st order Taylor Poly

Euler's method

$y_{n+1}=y_n+\frac{dy}{dx}\cdot\Delta x$

Feb 26-10:35 AM

Ex 1



$f'(1)=1$

Find the tan line at (1,2)

(tan to $y=f(x)$)

slope = 1

$y=1(x-1)+2$

Feb 26-10:46 AM

Ex 2

x	f(x)	f'(x)	f''(x)
1	3	-2	2

a) find the line tan to $y=f(x)$ at $x=1$

b) use the tan line to approximate $f(1.1)$

c) is your approximation high or low? justify

a) $y=-2(x-1)+3$

b) $f(1.1)\approx -2(.1)+3=2.8$

c) $f''(1)=2>0$ so f is concave up

$f'(1)=-2<0$ f is dec.

underest.

low

Feb 26-10:50 AM

Ex 3. $y+2 = \frac{x^2}{2} - 2\sin y$ tan line at $(2,0)$

slope $= \frac{dy}{dx}$

$\frac{dy}{dx} = x - 2\cos y \frac{dy}{dx}$

$\frac{dy}{dx} + 2\cos y \frac{dy}{dx} = x$

$\frac{dy}{dx}(1+2\cos y) = x$

$\frac{dy}{dx} = \frac{x}{1+2\cos y}\Big|_{(2,0)} = \frac{2}{1+2\cos 0} = \frac{2}{3}$

tan line $y = \frac{2}{3}(x-2)+0$

Feb 26-10:55 AM

Ex 4 $x = t^2 - 4t + 1$, $y = t^3$ tan line to $y = f(x)$ at $t = 2$

$\frac{dy}{dx} = \frac{\frac{dy}{dt}}{\frac{dx}{dt}} = \frac{3t^2}{2t-4}\Big|_{t=2} = \frac{12}{0}$ slope dne vertical line

$x(2) = -3$

$\boxed{x = -3}$

Feb 26-10:58 AM